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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte WAYNE A. SOEHREN, and CHARLES T. BYE

Appeal 2008-5408
Application 10/634,931
Technology Center 3700

Decided:[1] March 30, 2009

Before TONI R. SCHEINER, DEMETRA J. MILLS, and JEFFREY N. FREDMAN, *Administrative Patent Judges*.

MILLS, *Administrative Patent Judge*.

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[1] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

DECISION ON APPEAL

STATEMENT OF CASE

This is an appeal under 35 U.S.C. § 134. The Examiner has rejected the claims as anticipated, and as obvious. We have jurisdiction under 35 U.S.C. § 6(b). Claims 1-19 are pending, and the following claims are representative.

1. A human motion classification and measurement system, comprising:
sensors for sensing a human;
a motion classification unit connected to receive data from said sensors;
an energy estimator unit connected to receive data from at least one of said motion classification unit and said sensors; and
a Kalman filter connected to receive data from said motion classification unit and from said sensors, said Kalman filter having an output connected to said motion classification unit and said energy estimator unit so that said energy estimator unit is operable to identify an energy expenditure by the human.

2. A human motion classification and measurement system, comprising:
sensors for sensing a human;
an energy estimator unit and a health monitor unit connected to receive data from said sensors; and
a Kalman filter connected to receive data from said sensors and having an output connected to said energy estimator unit and said health monitor unit so that said energy estimator outputs an estimate of energy expended by the human and so that said health monitor outputs an indication of health of the human.

4. A human motion classification and measurement system, comprising:
a personal status sensor adapted for mounting on a human;
motion sensors adapted for mounting on a human;
a motion classification unit connected to receive data from said motion sensors and generate therefrom a motion type indicator signal; and

an output unit connected to said personal status sensors and to receive said motion type indicator signal, said output unit providing an output indicating a status of human activity of the human.

9. A human motion classification and measurement system as claimed in claim 4, further comprising:

a filter connected to receive data from said motion classification unit, said filter having an output connected to said motion classification unit and to said output unit.

10. A human motion classification and measurement system, comprising:

personal status sensors adapted for mounting to a human;

inertial sensors adapted for mounting to the human;

an altimeter adapted for mounting to the human;

a magnetic sensor adapted for mounting to the human;

a global positioning satellite sensor for mounting to a human;

a motion classification unit having inputs connected to said inertial sensors and said altimeter and said magnetic sensors, said motion classification unit having outputs for data identifying motion type of the human and distance traveled by the human;

an energy estimator and health monitor unit having inputs connected to said personal status sensors and said output of said motion classification unit for motion type data to output energy expenditure information on the human motion and to trigger an alarm upon traversal of a health threshold;

an inertial navigation unit connected to receive data from said inertial sensors and having a navigation state output;

an input preprocessing unit having inputs connected to said global positioning satellite sensor and said magnetic sensor and said altimeter and said motion classification unit and having an output; and

a filter connected to receive data from said output of said input preprocessing unit, said filter having an output connected to said motion classification unit and said energy estimator and health monitor units and said inertial navigation unit.

11. A human motion classification and measurement system as claimed in claim 10, further comprising:

a measurement prefilter connected between said input preprocessing unit and said filter; and

a human model provided as an input to said measurement prefilter.

15. A method for monitoring human motion, comprising the steps of
sensing motion and metabolism rate of a human;
classifying the motion of the human sensed in said sensing step; and
estimating energy expended by the human from the classified motion and from the metabolism rate.

Cited References

Root	US 6,013,007	Jan. 11, 2000
Foxlin	US 6,162,191	Dec. 19, 2000
Teller	US 2002/0019586 A1	Feb. 14, 2002
Vock	US 6,885,971 B2	Apr. 26, 2005

Grounds of Rejection

1. Claims 4-6, 9, and 15-17 are rejected under 35 U.S.C. § 102(b) as being anticipated by Root.[2]

2. Claims 1-3 and 7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Root in view of Foxlin.[3]

3. Claim 8 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Root in view of Vock.[4]

[2] The Examiner's Answer includes both New Grounds of Rejection and Previous Grounds of Rejection. Since the Examiner has not withdrawn the Previous Grounds of Rejection, we consider both New and Previous Grounds to remain pending. (Ans. 2-6.) This rejection is the same under both the New and Previous Grounds of Rejection.

[3] The Examiner's Answer includes both New Grounds of Rejection and Previous Grounds of Rejection. (Ans. 2-6.) This rejection is the same under both the New and Previous Grounds of Rejection.

4. Claims 8, and 10-14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Root in view of Vock and Foxlin.[5]

5. Claims 10-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Root in view of Foxlin in further view of Vock.[6]

6. Claim 14 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Root in view of Foxlin in view of Vock and in further view of Teller.[7]

7. Claims 18-19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Root in view of Teller.[8]

ISSUE

The principal issue raised by all of the rejections is whether Root discloses a motion classification unit.

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[4] The Examiner's Answer includes both New Grounds of Rejection and Previous Grounds of Rejection. (Ans. 2-6.) Claim 8 was previously rejected over Root in view of Vock and Foxlin and is newly rejected over Root in view of Vock. Both rejections are addressed herein.

[5] The Examiner's Answer includes both New Grounds of Rejection and Previous Grounds of Rejection. (Ans. 2-6.) This rejection is the same as a Previous Grounds of Rejection.

[6] The Examiner's Answer includes both New Grounds of Rejection and Previous Grounds of Rejection. (Ans. 2-6.) These claims were previously rejected over Root in view of Vock and Foxlin and are newly rejected over Root in view of Vock.

[7] The Examiner's Answer includes both New Grounds of Rejection and Previous Grounds of Rejection. (Ans. 2-6.) Claim 14 was previously rejected over Root in view of Vock and Foxlin. Claim 14 is newly rejected over Root in view of Vock, Foxlin and Teller.

[8] The Examiner's Answer includes both New Grounds of Rejection and Previous Grounds of Rejection. (Ans. 2-6.) This rejection is the same under both the New and Previous Grounds of Rejection. (See Final Rejection, page 3.)

The Examiner contends Root discloses a motion classification unit 602. (Ans. 4.)

Appellants argue that Root does not disclose a motion classification unit that classifies motion based on motion sensors and that speed is not a motion classification. (App. Br. 13-14.)

FINDINGS OF FACT

The Examiner finds that:

1. Regarding claims 4-6 and 9, Root discloses a motion monitoring, motion measuring, motion classification system configured to wear and/or mount on a human (as best seen in Figures 1A, 1B, 6, 11, and 12), as broadly as *structurally* claimed, comprising: a personal status sensor (elements 101 and 601) including a heart rate sensor (element 611) (column 2, l. 54 - column 3, l. 13); motion sensors (global position system sensor, GPS, elements 301 and 604) in data communication (i.e. a digital input-output relationship as is well-known in the art) with a motion classification unit (element 602) that generates an output signal indicative of a motion type (e.g. the magnitude of velocity, speed, and/or direction of motion positively recited in column 7 ll. 35-50)(column 2, ll. 8-16 and Abstract); an output unit (elements 112, 202, 605 and 606) in data communication (i.e., a digital input-output relationship as is well-known in the art) with said personal status sensor and said motion classification unit via a processor (element 602) that provides an output indicative of activity and/or performance level (column 2, ll. 16- 29, column 2, line 54 - column 3, line 13, column 7, ll. 41-67, and column 8, ll. 33-46); an energy estimator unit (the displayable and/or audible performance

measure of calories burned as seen in Figure 11) included in said output unit for providing an estimate of energy expended (column 7, ll. 44-67 and column 8, ll. 33-46); a health monitor unit (the displayable and/or audible performance measure of heart rate as seen in Figure 1) included in said output unit (column 7, ll. 44-67 and column 8, ll. 33-46) and operable to activate an alarm upon exceeding a physiological threshold (Figure 1 and column 2, ll. 17 - 25); and a filter (column 7, ll. 52 - 56 and the software of processor 602) in data communication (i.e., a digital input-output relationship as is well-known in the art) with said motion classification unit and said output unit. (Ans. 8-9.)

2. In regards to claims 1 and 2, Root discloses a human motion and classification system; sensors for sensing a human (611/612/610) including a personal status sensor (611/612) for mounting on a human; a motion classification unit (602); an energy estimator unit (Figure 11- calories burned); and a smart algorithm to filter out erroneous points resulting from signal interference (column 7, ll. 52 - 56). (Ans. 4.)

3. Root Fig. 10 discloses device configuration menus including a menu selection of "exercise session type" with choices of walking, running, bicycling, skating, skiing and other. (Root, col. 6, ll. 43-49, col. 6, l. 61 to col. 7, l. 5., Fig. 10). (Ans. 4.)

4. Root does not disclose specifically a Kalman filter. (Ans. 4.)

5. Foxlin teaches the use of a Kalman filter (sophisticated estimator-drift compensator) providing compensating signals, which makes use of the statistical features of all of the signals, analyzes the raw sensor signals and then generate output signals that decrease the risk of error in the signal

readings, and makes use of the compensating sensor signals even during time periods when they are subject to accelerations. (Foxlin, col. 4, l. 17-21; col. 13, l. 55 to col. 14, l. 7.) (Ans. 4)

6. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to replace the filter disclosed by Root with a Kalman filter as taught by Foxlin. (Ans. 5.)

7. Regarding claim 3, Root discloses a human motion classification and measurement system that comprises of an alarm (Figure 11 & column 2, ll. 17- 25) to indicate a traversal of a threshold. (Ans. 5.)

8. Regarding claim 7, Root discloses a personal status sensor (611/612); motion sensors (301/604); a motion classification unit (602); and an output unit (605). (Ans. 5.)

9. Root does not address the motion sensors are specifically inertial sensors including gyroscopic sensors and accelerometers. (Col. 6, l. 17-47, col. 14, l. 14.) (Ans. 5.)

10. Foxlin discloses the motion sensors that are specifically inertial sensors, which included gyroscopic sensors and accelerometers. (Ans. 5.)

11. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use motion sensors that are specifically inertial sensors, which include gyroscopic sensors and accelerometers in order to enhance tracking of the positions and motion of a human body.

12. Claims 8, 10, 11, 12, 13, & 14 are rejected under 35 U.S.C.§ 103(a) as being unpatentable over Root as applied to claim 4 above, and further in view of Vock and Foxlin. (Ans. 5.)

13. In regard to claim 8, Root discloses a human motion classification and measurement system, but does not disclose an altimeter or a magnetic sensor. (Ans. 5.)

14. Vock, a reference in an analogous art, discloses an altimeter for mounting on a human and having an output connected to said motion classification unit (column 1, ll. 20 - 25; column 43, ll. 32-50; column 59, ll. 14 - 16; & Claim 20). (Ans. 6.)

15. It would have been obvious to one having ordinary skill in the art at the time the invention was made to include an altimeter to sense the drop distance, as stated below: "Those skilled in the art should appreciate that an altimeter can also be placed in the watch ... so that ... the user is informed of drop distance." (Vock, column 45, ll. 3-5.) (Ans. 6.)

16. In regards to the magnetic sensor, as stated above Root discloses a human motion and measurement system, but does not disclose the magnetic sensor. (Ans. 6.)

17. However, Foxlin, a reference in an analogous art, discloses a magnetic sensor for mounting on the human and an output connected to said motion classification unit (Abstract; Figure 3, 112; column 4, ll. 9 - 11). (Ans. 6.)

18. It would have been obvious to one having ordinary skill in the art at the time the invention was made to include magnetic sensors into the system to further track the orientation of a body to which it is mounted (column 1, ll. 51 - 67) and "Magnetic trackers are the most popular because of their convenience of operation (they don't even require line of sight)." (column 1, ll. 37 – 39.) (Ans. 6.)

19. In regards to claim 10, Root in view of Foxlin discloses an inertial navigation unit (306) connected to receive data from the inertial sensors and having a navigation state output. (Ans. 6.)

20. In regards the input preprocessing unit in claim 10, the motion classification unit disclosed by Root (CPU 602) in view of Foxlin and Vock inherently has an input preprocessing unit having inputs connected to said global positioning satellite sensor and said magnetic sensor and said altimeter and said motion classification unit and having an output. (Ans. 6-7.)

21. Regarding claim 11, the input preprocessing unit and said filter are connected, thus there is inherently a measurement prefilter. (Ans. 7.)

20. In regards to claim 12, an input preprocessing unit inherently has an initial input. (Ans. 7.)

22. With regards to claim 13, the above sensors, which are adapted to mount onto a human, inherently has a human input to the input preprocessing unit. (Ans. 7.)

23. With regards to claim 14, all of the components of the human motion classification and measurement system have been rejected for all the reasons discussed previously. (Ans. 7.)

24. Claims 18 and 19 are rejected under 35 U.S.C. §103(a) as being unpatentable over. (Ans. 7.)

25. Root discloses all of the elements mentioned in the previous office action. (Ans. 7.)

26. However, Root does not disclose the personal status sensor including a respiration sensor and hydration sensor. (Ans. 7.)

27. Teller discloses a personal status sensor (10) including a respiration ([0044]) and hydration sensor ([0044]). Since one aspect of Root's invention is to provide a device to monitor a user's vital signs in order to issue warnings based on measurements as compared to the built in limits (column 2, ll. 17-20). (Ans. 7.)

28. It would have been obvious to one having ordinary skill in the art at the time of the invention to include a respiration sensor and hydration sensor, as disclosed by Teller, in order to obtain a more comprehensive assessment of an individual's health. (Ans. 7.)

29. Regarding claims 15-17, Root discloses a method of motion monitoring, motion measuring, motion classification via a system configured to wear and or mount on a human (as best seen in Figures 1A, 1B, 6, 11, and 12), as broadly as claimed, comprising the steps of:

sensing motion via motion sensors (elements 301 and 604) and classifying said sensed motion (e.g., the magnitude of the velocity, speed, and/or direction of motion positively recited in column 7, ll. 35-50) (column 2, ll. 8-16 and Abstract); sensing metabolic rate (the displayable and/or audible performance measure of calories burned as seen in Figure 11) and estimating energy expended from said sensed motion and said sensed metabolic rate (the displayable and/or audible performance measure of calories burned as seen in Figure 11); triggering an alarm if a physiological threshold is exceeded (Figure 11 and column 2, ll. 17 - 25); and providing landmarking position (e.g., location) data via a GPS (Abstract). (Ans. 9.)

30. Root discloses the claimed human motion measuring and motion classification system as set forth above except for explicitly disclosing

(a) using a Kalman filter in data communication (i.e., a digital input-output relationship as is well-known in the art) with the personal status sensors, the motion classification unit, and the energy estimator unit for minimizing the statistical error of the data and (b) the motion sensors being inertia/type sensors including accelerometers and gyroscopic sensors. (Ans.9-10.)

33. Foxlin teaches a human motion measuring and motion classification system, comprising: (a) using a Kalman filter (element 1327, abstract, column 4, ll. 17-22 and column 13, line 55 - column 14, l. 7) in data communication with personal status sensors (elements 1311 and 1312) and a motion classification unit (element 1326 that identifies/classifies the motion angle) for minimizing the statistical error of the data (column 20, l. 59 – column 21, l. 64) and (b) the motion sensors being inertial-type sensors including accelerometers (element 1311 of Figure 8 and column 6, ll. 38-46) and gyroscopic sensors (element 1312 of Figure 8 column 6, ll. 38-46). (Ans. 10.)

31. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the human motion measuring and motion classification system as taught by Root, with the data filter and sensors as taught by Foxlin for the purpose of increasing the efficacy of a human motion measuring and motion classification system to accurately measure; monitor, and classify potion based on sensed and processed data. (Ans. 10-11.)

32. Claim 8 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Root in view of Vock as broadly as claimed. (Ans. 11.)

33. Root discloses the claimed human motion measuring and motion classification system as set forth above except for explicitly disclosing the system comprising an altimeter and a magnetic sensor in data communication with the motion classification unit (however, Root does disclose measuring tracking changes in elevation and direction/heading in Figure 11, column 7, ll. 35-40, and column 8, ll. 47-51). (Ans. 11.)

34. Vock teaches a human motion measuring and motion classification system, comprising: an altimeter (element 14c) and a magnetic sensor (element 510) in data communication with a motion classification unit (element 12). (Ans. 11.)

35. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the human motion measuring and motion classification system as taught by Root, with the sensors as taught by Vock for the purpose of increasing the efficacy of a human motion measuring and motion classification system to accurately measure, monitor, and classify motion via a variety of interchangeable sensors. (Ans. 11.)

36. Claims 10-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Root in view of Foxlin as applied to claims 1-3 and 7 above and in further view of Vock. (Ans. 11.)

37. Root in view of Foxlin discloses the claimed human motion measuring and motion classification system as set forth above including (a) an inertial navigation unit (Foxlin, element 1326) in data communication with the inertial sensors providing an output and (b) an input preprocessing unit with an initial human model input that serves as a measurement prefilter (Root, the preprogrammed user data positively recited in column 6, l. 63 - column

7, l. 15 and seen in Figure 10) in data communication (i.e., a digital input-output relationship as is well-known in the art) with the GPS sensor and the motion classification system. (Ans. 11-12.)

38. Root in view of Foxlin discloses the claimed human motion measuring and motion classification system as set forth above except for explicitly disclosing: (a) the system comprising an altimeter and a magnetic sensor in data communication with the motion classification unit (however, Root does disclose measuring/tracking changes in elevation and direction/heading in Figure 11, column 7, ll. 35-40, and column 8, ll. 47-51) and (b) the input preprocessing unit in data communication with a magnetic sensor and an altimeter. (Ans. 12.)

39. Vock teaches a human motion measuring and motion classification system, comprising: (a) a system comprising an altimeter (Vock, element 14c) and a magnetic sensor (Vock, element 510) in data communication with the motion classification unit (Vock, element 12) and (b) the input preprocessing unit (Vock, element 1004 and column 43, l. 31 - column 44, l. 29) in data communication with the magnetic sensor and the altimeter. (Ans. 12.)

40. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the human motion measuring and motion classification system as taught by Root in view of Foxlin, with the sensors and filters as taught by Vock for the purpose of increasing the efficacy of a human motion measuring and motion classification system to accurately measure, monitor, and classify motion based on sensed and processed data. (Ans. 12-13.)

41. "Speed" is defined as "the rate or measure of the rate of motion." *Webster's II New Riverside Dictionary*, Riverside Publishing Co, Boston, MA (1994), p. 1117.
42. According to the Specification, page 12, ll. 4-22, motion type data is received from the motion classification unit and position information also provides the velocity (speed) in meters.
43. A generally linear relationship between step size and walking speed is present over various walking speeds. (Spec. 3: 12-18.)
44. Vock discloses that the controller subsystem may also include logic circuitry and/or software modules to logic out unwanted data from the sensors. Such preamplifiers and software modules function as prefilters of the data. (Col. 3, ll. 64 to col. 4. l. 23.)
45. Vock provides systems and methods for quantifying airtime, power, speed and/or drop distance to quantify a user's sport movement within one or more of the following activities: skiing, snowboarding, wind-surfing, skate-boarding, roller-blading, kayaking, white water racing, water skiing, wake-boarding, surfing, racing, running, and mountain biking. The invention can also be used to quantify the performance of vehicles upon which users ride, e.g., a snowboard or ski or mountain bike.

ANALYSIS

1. Claims 4-6, 9, and 15-17 are rejected under 35 U.S.C. § 102(b) as being anticipated by Root. We select claims 4, 9 and 15 as representative of this rejection as they are argued separately by Appellants in the Brief. (App. Br. 13-18.)

Claim 4

As to claim interpretation, Appellants claims do not define the structure of the "motion classification unit," nor is the motion classification unit defined in the Specification or does the Specification indicate how signals are handled by the motion classification unit.

Appellants contend that the classes of motion defined in the application include standing, walking or running. (App. Br. 13, Spec. 8, ll. 10-11.) Root, Fig. 10, discloses that its device has device configuration menus including a menu for selection of "exercise session type" with choices of walking, running, bicycling, skating, skiing and other. (Root, col. 6, ll. 43-49, col. 6, l. 61 to col. 7, l. 5., Fig. 10.) Appellants contend that it is the user in Root that is the motion classification unit, because the user, not the CPU, classifies the motion.

We are not persuaded by Appellants argument. While Appellants argue that it is the user in Root which is the motion classification unit (App. Br. 16), it is the Root device itself that has device configuration menus in the CPU including a menu for selection of "exercise session type" with choices of walking, running, bicycling, skating, skiing and other. (Root, col. 6, ll. 43-49, col. 6, l. 61 to col. 7, l. 5., Fig. 10). Thus, we agree with the Examiner that the device of Root possesses a motion classification unit. (FF 1, 2, 3.)

In response to the Examiner's prima facie case of obviousness, Appellants contend that "speed" described in Root, is not a motion classification, as claimed. According to Appellants, "speed" is a continuous parameter, while the motion classifications defined in the present application

are separate, non-contiguous categories of motion that lend themselves to classification. Each class of motion includes a range of speeds. The range of speeds for a class of motion can overlap with the range of speeds for another class of motion. For example, the speed of walking forward on a flat surface can be the same as the speed of walking up stairs, but the class of motion as defined in the present application is different. (App. Br. 14.)

When Root teaches that a "smart algorithm based on measured parameters such as speed, pace, exercise type, heart rate and so forth can be optionally used to automatically determine if the athlete has temporarily suspended exercising" (Root, col. 8, ll. 5-8), the computational unit with this algorithm functions, at a minimum, to classify motion and differentiate between the motion of "standing (no motion)" and (walking (slow motion), or running (fast motion)" (*see* Spec. 8, ll. 10-11).

The Appellants assert that the speed of a person does not indicate whether the person is engaging in any of the motion types shown in Figure 10 of the Root patent, i.e., running, bicycling, hiking/walking, skating, skiing, or other. Indeed, the Root patent recognizes that speed does not indicate motion type because, although the Root patent discloses determining speed, the user is still required to manually input exercise session type through a menu process. Specifically, the Root patent describes "main menus designated as 'exercise session type..." (column 6, ll. 43-44) and states that "before exercising, the athlete turns on the GPS-based personal performance monitor.. . and sets his/her preferences using menu control buttons.. ." (Column 6, ll. 63-66). The input of exercise session type by a user using menu control buttons is not a motion classification

unit that classifies motion based on motion sensors. (App. Br. 14.)

We are not convinced, and do not find Appellants arguments concerning "speed" to be on point. As discussed herein, the device of Root includes a menu for selection of "exercise session type" with choices of walking, running, bicycling, skating, skiing and other. (Root, col. 6, ll. 43-49, col. 6, l. 61 to col. 7, l. 5., Fig. 10.) (FF 3.)

Claim 9

Appellants contend that the Examiner's reliance on Root, column 7, lines 52-56 for teaching of a filter which receives data from the motion classification unit and having an output connected to an output unit, is in error. (App. Br. 16.) Appellants speculate that the smart algorithm of Root could execute in the GPS receiver and receive no input from the CPU. (App. Br. 16.)

Appellants have failed to address the Examiner's specific indications as to where each of the elements of Claim 9 is taught in Root (FF 1) and therefore, Appellants have not rebutted the rejection of the Examiner. (See also Ans. 4.)

The obviousness rejection is affirmed.

Claim 15

Appellants contend that Root does not disclose using sensed motion in order to classify human motion (App. Br. 17) and that Root does not disclose sensing metabolism or using metabolism with motion class to estimate expended energy. (App. Br. 18.)

Appellants have failed to address the Examiner's specific indications as to where each of the elements of Claim 15 are taught in Root (FF 29) and therefore, Appellants have not rebutted the rejection of the Examiner. (See also Ans. 4.)

The obviousness rejection is affirmed.

2. Claims 1-3 and 7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Root in view of Foxlin. 3. Claim 8 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Root in view of Vock. 6. Claim 14 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Root in view of Foxlin in view of Vock and in further view of Teller. 7. Claims 18-19 are rejected under 35 U.S.C. §103(a) as being unpatentable over Root in view of Teller.

Appellants present similar arguments in response to these rejections as previously argued concerning the motion classification unit. (App. Br. 20-29.) For the reasons given herein we affirm these rejections.

4. Claims 8, and 10-14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Root in view of Vock and Foxlin. 5. Claims 10-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Root in view of Foxlin in further view of Vock. We select claim 11 as representative of these claim groupings.

To the extent that Appellants argue with respect to claims 8, 10 and 14 that neither Root nor Foxlin disclose a motion classification unit (App. Br. 23-25, 27), we affirm these rejections for the reasons discussed above.

Claim 11 recites a measurement system further comprising a measurement prefilter connected between said input preprocessing unit and said filter; and a human model provided as an input to said measurement prefilter.

With respect to claim 11, Appellants argue that neither cited reference discloses inputting a human model into the system. (App. Br. 26.)

According to Appellants' the Specification, page 12:

> [t]he input preprocessing unit 32 receives the motion type data from the motion classification unit 28, the landmarking data from the human input 36, the altitude information from the altimeter 30, the absolute position information from the initial input unit 38, the magnetic direction information from the magnetic sensors 34, the pseudo-range or delta range information from the Global Positioning Satellite (GPS) system or differential global positioning satellite system (DGPS) 40 and the distance traveled information from the motion classification unit 28, as well as data from the Kalman filter 41. From these inputs, the input preprocessing unit 32 provides data on the measured motion to a measurement pre-filter 50. The measurement pre-filter 50 has provided to it a human motion model 52 and information on the state of the person (the user) being monitored. The output of the measurement unit 50 is provided to the Kalman filter 41, which in turn provides the information to a Position, Individual Motion confidence unit 54. This is an estimate of how well the position, velocity and attitude are known. The Kalman filter provides this as a covariance of each of the navigation states. For position, this is expressed in meters; in other words a position of x, y, and z with an accuracy of n meters. The position information also provides velocity in meters per second and attitude in radians (or other angular measurement). The Kalman filter 41 also generates signals as Kalman filter resets that is provided to the inertial navigation system 26, the energy estimator and

> health monitor units 22 and 42, the motion classification unit 28 and the input preprocessing unit 32. [Emphasis added.]

Thus the claim 11 motion classification and measurement system has an input preprocessing unit that provides data on measured motions and a prefilter of human motion models.

The Examiner finds that Root discloses a motion monitoring, motion measuring, motion classification system configured to wear and/or mount on a human (as best seen in Figures 1A, 1B, 6, 11, and 12), as broadly as *structurally* claimed, comprising: a personal status sensor (elements 101 and 601) including a heart rate sensor (element 611) (column 2, l. 54 - column 3, l. 13); motion sensors (global position system sensor, GPS, elements 301 and 604) in data communication (i.e. a digital input-output relationship as is well-known in the art) with a motion classification unit (element 602) that generates an output signal indicative of a motion type (e.g. the magnitude of velocity, speed, and/or direction of motion positively recited in column 7, ll. 35-50)(column 2, ll. 8-16 and Abstract); an output unit (elements 112, 202, 605 and 606) in data communication (i.e., a digital input-output relationship as is well-known in the art) with said personal status sensor and said motion classification unit via a processor (element 602) that provides an output indicative of activity and/or performance level (column 2, ll. 16- 29, column 2, line 54 - column 3, line 13, column 7, ll. 41-67, and column 8, ll. 33-46); an energy estimator unit (the displayable and/or audible performance measure of calories burned as seen in Figure 11) included in said output unit for providing an estimate of energy expended (column 7, ll. 44-67 and column 8, ll. 33-46); a health monitor unit (the displayable and/or audible

performance measure of heart rate as seen in Figure 1) included in said output unit (column 7, ll. 44-67 and column 8, ll. 33-46) and operable to activate an alarm upon exceeding a physiological threshold (Figure 1 and column 2, ll. 17 - 25); and a filter (column 7, ll. 52 - 56 and the software of processor 602) in data communication (i.e., a digital input-output relationship as is well-known in the art) with said motion classification unit and said output unit. (Ans. 8-9.) (FF 1.)

Vock also provides systems and methods for quantifying airtime, power, speed and/or drop distance to quantify a user's sport movement within one or more of the following activities: skiing, snowboarding, wind-surfing, skate-boarding, roller-blading, kayaking, white water racing, water skiing, wake-boarding, surfing, racing, running, and mountain biking. The invention can also be used to quantify the performance of vehicles upon which users ride, e.g., a snowboard or ski or mountain bike. Vock teaches a human motion measuring and motion classification system, comprising: (a) a system comprising an altimeter (Vock, element 14c) and a magnetic sensor (Vock, element 510) in data communication with the motion classification unit (Vock, element 12) and (b) the input preprocessing unit (Vock, element 1004 and column 43, l. 31 - column 44, l. 29) in data communication with the magnetic sensor and the altimeter. (Ans. 12.) (FF 39.) In addition, in Vock the controller subsystem may include a microprocessor with motion preamplifiers and AD converters to interface with the sensors. The controller subsystem may also include logic circuitry and/or software modules to logic out unwanted data from the sensors, which reasonably includes motion data since motion data is being measured. Such

preamplifiers and software modules function as prefilters of the motion data. (Col. 3, ll. 64 to col. 4. l. 23.) Also in Vock, the pressure sensor of the altimeter indicates pressure by analog voltage. (Vock, col. 43, ll. 32-49.) The voltage is conditioned by conditioning electronics so that the output data is filtered and has an appropriate scale factor. (Vock, col. 43, ll. 32-49.) Thus, the altimeter of Vock also has a prefilter.

The Examiner concludes that it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the human motion measuring and motion classification system as taught by Root in view of Foxlin, with the sensors and filters as taught by Vock for the purpose of increasing the efficacy of a human motion measuring and motion classification system to accurately measure, monitor, and classify motion based on sensed and processed data. (Ans. 12-13.) (FF 40.)

Thus the Examiner concludes that the input preprocessing unit of Root is the motion classification unit disclosed by Root (602) and that it inherently has an input preprocessing unit having inputs connected to the global positioning satellite sensor and said magnetic sensor and the altimeter (FF 14, 15, 20, 34, 38) and the motion classification unit communicates with the system and thus has an output.

The Appellants have failed to find flaw in the Examiner's analysis or address the features which the Examiner considers to be the prefilter of human motion model.

In view of the above, we affirm the rejection of claim 11.

CONCLUSION OF LAW AND DECISION

The obviousness rejections are affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

dm

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